DOCUMENT RESUME

ED 288 286 EC 200 757

AUTHOR Akamatsu, Carol Tane
TITLE The Role of Instruction in Text Structure and Metacognitive Strategy Instruction in Deaf Students' Learning To Read and Write Stories.
PUB DATE Apr 87
NOTE 39p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Deafness; Intermediate Grades; *Learning Strategies; *Literacy; Maintenance; Metacognition; Story Grammar; *Writing Skills

ABSTRACT

Metacognitive strategy instruction was used to teach two deaf children (ages 11 and 12) with differing American Sign Language and English language skills to summarize stories in writing. The instructional program used a knowledge of text structure--specifically story structure--to improve literacy skills by enhancing the children's ability to comprehend, remember, and generate stories. Program components addressed learning reasons for summarizing, identifying the kinds of information contained in a story, finding this information, organizing it for a summary, and writing the actual summary. Mechanical aspects of writing such as grammar, spelling, and punctuation were not stressed. Effectiveness of the program was evaluated using a single-subject design. Baseline measures revealed that the subjects had only a meager knowledge of story structure. During intervention, subjects' performance rose dramatically. Although the summaries they produced were not mechanically perfect, they had the structure of a story and therefore appeared to be better writing samples than those produced before intervention. In one subject, this level of performance was maintained; in the other, performance declined during the maintenance period. (Author/VW)

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The role of instruction in text structure and metacognitive strategy instruction in deaf students' learning to read and write stories

Carol Tane Akamatsu
Counseling, Educational Psychology & Special Education
Michigan State University
East Lansing, MI 48824

Running head: Text structure, metacognition and literacy

Paper to be presented at the American Educational Research Association, Washington, D.C., April 20-24, 1987.

EC200757

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ABSTRACT

Two subjects with differing ASL and English language skills participated in a program of instruction for teaching deaf children summarization skills based on a knowledge of story structure. Effectiveness of this program was evaluated using single-subject design. Baseline measures revealed that these subjects had only a meagre knowledge of story structure. During intervention, subjects' performance rose drammatically. In one subject, this level of performance was maintained; in the other, performance declined during the maintenance period. The instructional program and results are discussed in terms of metacognitive strategy instruction for developing literacy skills in deaf children.

THE ROLE OF INSTRUCTION IN TEXT STRUCTURE THROUGH METACOGNITIVE STRATEGY INSTRUCTION IN DEAF STUDENTS' LEARNING TO READ AND WRITE STORIES

Introduction

The research I am presenting here draws from two major bodies of literature: text structure and metacognitive strategy instruction. This study describes a program of metacognitive strategy instruction for teaching deaf children summarization skills based on a knowledge of a particular kind of text structure -- story structure -- and reports on the results of two children who participated in this instructional program.

It is said that children spend their early school years learning to read. After that, they read to learn. Similarly, the volume on writing edited by Kretschmer (1985) addresses the idea of learning to write and writing to learn. Current thinking on literacy also speaks to the interaction between reading and writing: reading to write and writing to read, as well as the interaction among reading, writing, and learning (Raphael, 1986). The research presented in this paper focusses on the interaction among reading, writing and learning.

The literature on the literacy skills of deaf children is replete with discussion on the differences in written productions between deaf children and hearing children

(Charrow, 1981; Heider & Heider, 1940; Myklebust, 1964; Quigley & Paul, 1984; Quigley, Wilbur, Power, Montanelli & Steinkamp 1976; Wilbur, 1977). These studies have noted that there are specific syntactic structures with which deaf children have difficulty, and that certain rules of standard English that are systematically violated, even by children who supposedly received signed English in school.

Bockmiller (1981) stated that when deaf children learn to read, they learn to read in a language that is unfamiliar to them, regardless of whether they were exposed to ASL or signed forms of English. With an average reading level somewhere between the third and fourth grade by the time a student graduates from high school, there is concern that even with the English signing systems, we have not achieved the hoped-for effect of making English accessible enough for deaf students to enabling them to use it as a base upon which to build literacy skills.

Deaf students are typically at a considerable disadvantage relative to hearing students because of a lack of easy access to background knowledge and strategies for interpreting situations that they witness, both of which contribute to the ability to construct meaning from text. Reading instruction for deaf students that consists of adaptation in method for teaching reading to hearing

children often assume a much more extensive language base than most deaf children have (Clarke, Rogers, and Booth, 1982). King & Quigley (1985) reinforce this idea by pointing out that relatively little is known about current practices in reading instruction, and that not much research is being done on the effects of various reading instructional practices with deaf children.

There are a number of possible reasons why deaf children have not achieved the hoped-for gains. In the course of the signing revolution in the schools, many teachers were hard pressed to learn the systems quickly (or partially), and educational policy and planning occurred with very little empirical information on the effectiveness of these systems. The assumption existed that deaf children would acquire English as their hearing peers did (albeit in a manual rather than vocal form), and the learning of reading and writing skills would similarly follow as easily. Secondly, because most deaf students have tremendous difficulty with English grammar and vocabulary, instruction tends to get bogged down in the mechanics of sentence construction on paper. Consequently, the flow of ideas, and the opportunity to manipulate the ideas and think through an idea are sometimes lost.

Current thinking is beginning to change. Rather than implicit instruction in English via the constant and

consistent use of manually coded English, or explicit instruction that focusses on the structural form of English sentences, works such as Reading and Deafness (King & Quigley, 1985), Learning to Write and Writing to Learn (edited by Kretschmer, 1985), among others, have begun to address new ideas for improving the instruction of English that focus on the function of literacy in English. Investigations of the development of literacy are process-oriented, rather than product-oriented. Further, the relationship between reading, writing, and learning is being recognized as something to be exploited in instructional practices. Ethnographic and descriptive studies of literacy in young deaf children are changing the picture of how to teach literacy and do research on literacy instruction in deaf children (Ewoldt, 1985; Maxwell, 1985).

One approach to building literacy skills that takes advantage of deaf children's existing cognitive skills is the use of text structure to enable one to write (and read) comprehensible pieces. The next section explains the notion of text structure, and how it can be used in literacy instruction with deaf children.

Text structure

Why is text structure important? It allows the reader of listener to organize information for storage in long-term memory, it allows easier retrieval of information in memory, and it allows the writer or speaker to structure information to make it easier for the reader or listener to comprehend. We are all very familiar with a particular kind of text structure, which I will term the "research report" structure. You expect me to tell you what the problem is, why it is important, what we know about it so far, what question(s) I asked for this study, the method I used to find the answer, what I found, and how what I found is related to what we already knew about it. If I were to deviate from this structure, you probably would accuse me of being disorganized and not able to think clearly. The information I have to present would not be readily accessible to you.

Various forms of text structure have been identified and discussed in the literature. Examples of these include the descriptive narrative, compare-contrast, persuasive essays, how-to's, stories, and so forth. There is disagreement about the usefulness of these labels and descriptions thereof for the purposes of writing instruction, and it is beyond the scope of this paper to go into that discussion. However, one genre that has been

investigated extensively is that of the story. I chose to focus on the story because it is a commonly occurring text form to which young children are exposed.

Experimental data have shown that we structure our memory for stories around semantically related elements (Rumelhart, 1977; Glenn, 1978; Mandler, 1978). Different researchers have labeled and described the story elements, and proposed various theories of how these elements are related (Thorndike, 1977; Rumelhart, 1975; Glenn, 1978; Mandler, 1978). The common elements across all theories include the setting (time, place, main character(s)), the problem, the actions of the main character to solve the problem, and the outcome. Well-formed stories all have these elements, usually in the order just mentioned. Techniques such as the use of suspense and flashback are the result of creative manipulation of the elements.

Stein and Glenn (1978) have shown that children have the notion of a well-formed story, and that certain meaningful units of a story are more important to the storage and later recall of a story than are other parts. This knowledge is something that develops over time, and age-related differences can be found in children's memory for stories.

It would seem reasonable, therefore, that children who are not able to construct or reconstruct age-appropriate story might benefit from instruction in the text structure of stories. Such instruction would serve to alert the child to the presence of a structure, and enable the child to reconstruct that structure in his/her own mind, and to retell that story in such a way that others can comprehend the story. Furthermore, we can expect that deaf children possessing normal cognitive processes to use their knowledge of story structure in comprehending, remembering and generating stories.

Instruction in text structure, in this case, story structure, can proceed in various ways, among which is through metacognitive strategy instruction. Research on hearing students has demonstrated that teaching the thinking involved in writing enables students to learn the cognitive processes involved in writing (Applebee, 1981; Raphael, Englert, and Kirschner, 1986; Rubin and Hansen, 1984). In this study, I chose to use metacognitive strategy instruction as the means for teaching text structure.

Metacognitive strategy instruction

Metacognition is defined as the "knowledge concerning one's own cognitive processes and products" (Flavell, 1976, p. 232). It is that which enables us to know whether or not we know something, and to know what we need to do to learn

something new. Research from metacognitive strategy instruction has enabled the development of new instructional practices for use with mildly handicapped students. Palincsar (1986) points out that through metacognitive strategy instruction, the teacher externalizes thinking for the child to perceive the thinking process. This enables the child to recognize a problem and reproduce a solution. The teacher must instruct students about strategies for solving a problem, and also teach students to monitor and regulate their own use of strategies. In this sense, teachers empower students with information and relinquish control for the application of cognitive strategies. Students become "self-regulated learners" through informed strategy training: what the strategies are, how they work, why they are useful, and when they can be applied (Paris & Oka, 1986).

Metacognitive strategy instruction (MSI) has its basis in the theory of cognitive development most often attributed to Vygotsky (Wertsch, 1981). Very briefly, Vygotsky asserted that the origins of cognition are rooted in social interaction. That is, one learns to think by observing others thinking, much as one learns to do by observing others doing. Cognition, then begins as an inter-personal process, and slowly becomes internalized to become an intra-

personal process. An example of this process may be seen in the following vignette:

A young child can't find his shoes; he cannot remember where he put them. He asks his mother where his shoes are. His mother does not know. So she asks him, "Where did you last see them?"

"I don't know."

"Are they in the hall near the front door?"

The child checks. No shoes.

"Are they in your room?"

The child performs a cursory check. No shoes.

"Under your bed?"

The child crouches down, looks, and finds the shoes.

Who did the remembering? Vygotsky would argue that the memory emerged from the dyad. Neither the child nor the mother knew where the shoes were. as the child grows, he learns to ask these questions and eventually internalizes the search process. Adults attempting new or difficult tasks are known to talk themselves through such tasks.

This notion can be applied to instruction, and has been termed "teacher mediated instruction" (Pearson and Gallagher, 1983). The proportion of responsibility for task completion belongs initially to the teacher. The teacher

models the solution to a problem. Gradually, responsibility for the solution to similar problems is given to the student, first through teacher-student interaction, then through student-student interaction (also termed peer mediation, cooperative or collaborative learning). Finally, the student is expected to take full responsibility for independent practice or application. Through guided practice, the student internalizes the solution to the problem, as the teacher relinquishes responsiblity.

In the case of deaf children, difficulties arise because they are not privy to the full gamut of social communication in their environment. It is not uncommon to find educational programs for deaf children where hearing teachers and other adults only sign when addressing a specific deaf child, but not when addressing a hearing adult. Research on cognitive processes in deaf children has shown that deaf children use the same cognitive processes as do hearing children (Martin, 1985). Differences in performance arise because deaf children do not always have access to the same information (particularly in the domains of language and communication) as hearing children. It seems reasonable, therefore, to hypothesize that MSI can be used successfully with deaf children.

In summary, research from two major bodies of literature, text structure and metacognitive strategy instruction, can be used to inform the study of literacy instruction in deaf children. The study described here is an investigation of a program of metacognitive strategy instruction for teaching deaf children summarization skills based on a knowledge of a particular kind of text structure, that of story structure. In this study, I investigated the use of MSI to teach story structure to two deaf fifth graders. I became interested in this topic through conversations with classroom teachers who had begun a writing program with their students. As of the beginning of the project, the writing program consisted mostly of dialogue journals between the teachers and individual students (the students did not dialogue with each other). In these journals were "book reports" on stories, which were basically story summaries. A common observation of students writing these summaries consisted of the following steps:

1. Write title and author and number of pages in the book.
2. Copy first sentence.
3. Skip a few pages, copy a sentence.
4. Repeat step 3 a few times.
5. Copy last sentence.

These observations suggest that the children did not exhibit knowledge of story structure in their summaries of stories. I hypothesized that the lack of structure in the students' writing was due to their not being aware that the stories they read had any structure other than a chronological sequence of sentences.

Method

Subjects. Two subjects participated in this study. Both were enrolled in a public school program for hearing-impaired children in an urban school. This school also housed the program for physically or otherwise health impaired children, as well as normally hearing, able-bodied children. The subjects in this study were mainstreamed out at various times of the day. The classrooms were staffed by trained teachers of the deaf and interpreters and teacher aides, all of whom were fluent signers. Both the teachers and the interpreters used combinations of Manually Coded English (MCE). All students in the hearing-impaired program used auditory trainers during the school day. Many also had personal hearing aids for out-of-class use.

Subject 1, age 11;3, is a child of deaf parents, both of whom have provided a consistent and complete signing environment for her. She has had consistent deaf adult contact all her life. Her audiogram indicates an unaided

severe-to-profound hearing impairment; with amplification, she has a pure tone average (PTA) of 35dB.

The Acquired Language Base Rating (ALBR) and the ASL Preference (ASLP) Scales were used to decide on strength of language base and language preference (Luetke-Stahlman, 1984). These scales use demographic information that has been shown to be predictive of ASL and English acquisition. This subject's ALBR score of 4 indicates a strong language base; ASL Ability Rating of 4 indicates an ASL tendency. Her teacher also notes that she is a "beautiful Signed English user".

Subject 2, age 12;3, has an unaided severe to profound loss; with amplification, she has a two-frequency PTA of 40dB. No consistent signed input is provided at home. This subject's ALBR of 1 indicates a weak language base, but her ASL preference rating of 3 suggests that she is a sign system user or potential ASL user.

Instructional materials. Instructional materials, based on stories developed by Glenn (1978) used single episodic stories containing six elements: setting, initiating event, internal response, action, consequence and reaction. The materials were designed to make students aware of the structure of stories, the questions that authors write to answer, provide students with a framework for organizing and remembering story information, and teach students to use the

framework for writing summaries of the stories they read. A workbook containing these instructional materials was constructed for each student.

Assessment materials. Assessment instruments used for baseline, intervention probes and maintenance checks were developed specifically for this study. Students were given a story passage to read and summarize in their own words or using words from the text. They were not to turn back to the text for information during the writing task. All passages were of median difficulty, and presentation order randomized to control for any passage effects.

Procedure. Baseline data were collected prior to beginning of intervention. Subjects were administered a story passage and instructed to "read and summarize the story". No explicit instruction about how to perform this task was given to ensure that the effects of eventual instruction on summarization could be discerned.

Metacognitive strategy instruction was provided by the classroom teacher, three days per week, for a total of nine days of instructional intervention. This instruction included began with the teacher "thinking aloud" about why she would summarize a story, and how she would go about doing the summarizing. A sample teacher's "think-aloud" is presented in Figure 1.

Insert Figure 1 about here

On the first day, students were introduced to what they would be studying, and why it was important to learn about it. The concept of story structure was presented, and the elements of that structure were taught in the context of a hightly familiar story (e.g. Goldilock and the Three Bears or Little Red Riding Hood).

The second day began with a review of the material taught on the first day, and an introduction to the story structure chart. Phrases used to signal the parts of the story were pointed out to the students (e.g. "There was a person named xxx" for main character,, One day, such-andsuch happened" for initiating event, "So, she thought/wanted to/decided to do xxx for plan and so on). A second story was used for this instruction. Students were encouraged to generate this information for themselves. Feedback on why responses were correct or incorrect was provided, and discussions focussed on how reading to answer questions and organize information help students remember more material for longer periods of time.

On the third day of instruction, the students practiced recognizing information from stories provided in their workbooks. The workbooks contained stories like those used

during the first two days. Beneath each story was the following series of questions:

1. What was the setting?
2. What was the initiating event?
3. What was [the main character]'s internal reaction?
4. What was/were the actions?
5. What was the consequence/outcome?
6. How did [the main character] feel in the end?

Students initially answered the questions as a group, and later on their own, in writing, using information they had gleaned from the text. During this practice, individualized attention was given to the students.

On the fourth day of instruction, the students were introduced to summary writing, using the questions and a summary chart as a guide. The guide to writing summaries was introduced and students were instructed in its use. Using other stories, students practiced writing summaries of stories on this day, and through day nine of the intervention.

The instruction was designed to teach students a) reasons for summarizing, b) what kinds of information are contained in a story, c) how to find this information, d) how to organize it for a summary, and e) how to write the actual summary. To aid the students in performing

independently, a bulletin board on story structure was put up in the classroom.

The students were given two maintenance checks, one immediately following the withdrawal of intervention, and one three weeks later.

Writing was scored for presence or absence of story structure elements. The story summaries were scored on a six-point scale for presence of the story components. One point was given for each correct occurrence of setting (S), initiating event (IE), internal response (IR), action (A), consequence, (C), and reaction (R) per story. Scores could range from 0 (no story structure information) to 6 (all elements present).

Scores on the baseline, intervention and maintenance assessments of the instructional study were used to compare ease in learning the task of story summarization with acquired language base and language/system preference.

Recall of specific story elements. All measures of writing skills were subjected to visual analysis. Phase means and daily scores were graphed. Level changes, trends in the data, and stability of the data will be discussed.

Results

Subject 1.

This subject's ALBR score of 4 indicates a strong language base; her ASLP rating of 4 indicates that she is

an ASL user. Her teacher also notes that she is a "beautiful Signed English user", but did not define what she meant by that term. Informal observation by the researcher suggests that this mean that, when specifically asked for English, this subject signs in English work order using morphological markers that have come into common use from the invented systems for signing English. Data for this subject are graphed in Figure 2.

Insert Figure 2 about here

Subject 1 began with a relatively low but stable baseline performance. During intervention, she was able to perform at a high level, except for days 6 and 7. The first intervention probe indicated that she had not fully mastered the material. The reason for the drop in her daily performance level on days 6 and 7 is unclear, especially since her score on the intervention probe on day 6 was high. The intervention probe after day 9 reflects a decline in performance. Her mean score on the intervention probes was 3.33. Observation of this subject indicated that she was relying on the information on the bulletin board, but was also performing the task independently of the teacher. Performance during maintenance was erratic. Perhaps with

additional practice, her performance will stabilize at a level higher than at baseline.

Subject 2.

This subject's ALBR of 1 indicates a weak language base, but her ASLP rating suggests that she is a sign system user or a potential ASL user. Data for this subject are graphed in Figure 3.

Insert Figure 3 about here

Subject 2 was included because her performance during baseline was erratic, and not indicative of a solid ability to summarize stories. During intervention and maintenance, performance was high and stable. The mean intervention probe score was 5.00 and the maintenance scores were both 6.00.

Overall performance.

The baseline data from these subjects indicated that they understood the stories to some extent, but did not know how to write a summary of the story. During the intervention phase, the performance of both subjects was high, typically averaging between five and six points per story on daily work. Intervention probes taken during this time show a slightly lower level of performance, but still higher than at baseline.

An example of a baseline summary follows.

Unlucky Tom

Tom fell out of swing. Tom's legs is broke. Tom fell out of woron [wagon] Tom must stay at Bed then he like well. tom's momDad flet sorry for tom. Mom and Dad saw tom came home. tom Hurt his Legs and arms then tom's mom call to shcool tom can't come to shcool. then tom miss chlidern and techer. tom's mom aDad go to halpd for tom. tom watch T.V. bout naws. then tom go eat Lunch. the tom go to sleep. tom's mom and DaD hope ok.

It should be noted that the story this student summarized ended with the parents' feeling sorry for Tom. The entire second half of this summary is entirely of the student's own creation, which is nice, but not the task set for the student.

During the intervention phase, the following summary was written:

This is a story about agatha the cat. agatha and squirrel live yard and play big tree. agatha saw squirrel eat acorn. Agatha feel want chase the squirrel. agatha and Squirrel goup [go up] tree. Agatha can't out the tree. agatha feel sad.

This summary has the information presented in the original, and does not contain extraneous detail nor fabrications of the child's imagination. This is not to denigrate the child's fantasy, but to point out that summaries are not supposed to include such information.

Recall of specific story elements. Recall of specific story elements varied. Stein and Glenn (1978) found that young children easily recalled attempts and consequences, but found internal responses to be difficult to recall. During baseline, this seemed to be true for these subjects, as well. In their written summaries, the consequence seemed to be the best recalled item, and the setting and internal response the worst. During this phase, the bulletin board with the story elements listed was in full view of the children for them to use as they saw fit (but without any particular instruction to use it). Thus, the writing task was less of a recall task than Stein and Glenn's (1978) story retelling task was. Figure 4 compares the number of elements recalled compared to the number that could be recalled, during baseline. Recall from Figures 2 and 3 that Subject 1 had two baseline measures, whereas Subject 2 had five.

During intervention, all elements were included most of the time, with no particular element being favored. This is presented in Figure 5. The fact that so many elements

were included during the intervention phase speaks to the children's use of the bulletin board information during this phase. The teachers report that the children's reliance on the bulletin board decreased over the course of the intervention.

Discussion

The achievement of literacy results from the learning of a number of smaller skills, the ease of acquisition of which is task-dependent. This task was taught as a cognitive task rather than as a grammar task. That is, the children were taught to summarize stories as part of a process of learning a) reasons for summarizing, b) what kinds of information are contained in a story, c) how to find this information, d) how to organize it for a summary, and e) how to write the actual summary. Mechanical aspects of writing -- grammar, spelling, punctuation -- were not stressed. The resulting summaries were not mechanically perfect, but did have the structure of a story, and consequently appeared to be better writing samples than those produced before intervention.

Interestingly, the teachers who participated in this study were somewhat skeptical of the procedure in the beginning, particularly because grammar was de-emphasized. As the intervention proceded, however, they became increasingly supportive of this procedure and more motivated

to try variations on the theme. What would happen, for example, with instruction with multi-episodic stories? What would happen with stories that were told in flashback, e.g., beginning with the consequence and only later establishing the setting? They began to share these ideas with the teachers of hearing children in their schools.

The literature on literacy instruction has documented an inextricable relationship between reading and writing. Well-formed text is easier to read and remember than poorly organized text. Strategies for reading various kinds of text which include questioning and comprehension monitoring have been shown to improve performance on reading tasks.

In this study, we investigated summarization of very short stories. The summaries were written for others to read. Through metacognitive strategy instruction, the children were able to produce summaries that retained the structure of a story, but were condensed from their original form. The task taught in this study was couched as a writing task for the children, but the strategies included learning how to read the text in order to collect information to include in the summary. In addition, it included information about what authors do when they write. The instruction was shown to have a beneficial effect on the students involved.

The task of summarization is only one form of writing, but involves a number of specific cognitive operations (Hidi and Anderson, 1986). The demands of the summarization task depend on the type of text to be summarized, whether or not the text is available to the student during summarization (affects memory), and the type of summary to be produced. Summaries may be written for oneself (for example as a study tool), or for others to read. Developmental differences exist in terms of the ability of children to deal with different kinds of text, to discriminate between more and less important information, and to condense material.

There is a belief among many that a strong language base will make learning writing easier, writing will be more comprehensible, and that improvements in grammaticality will improve longer passages of prose. Because writing must occur in the English language, attempts to build that strong base include the use of various forms of MCE. However, much of the teaching of writing to hearing impaired students has focussed on structural approaches that dwell on grammatical aspects of English. Students have not developed the flexibilty to read or write that they seem to develop in signing. Attempts by Armour and others to increase students' awareness of their linguistic skills in signing, and using that information to aid in writing grammatical English is one type of cognitive strategy approach (Neilson & Armour,

1983; Armour, 1985; Akamatsu & Armour, in press). It may not be enough, however.

As it stands, the generalizability of these findings is limited, but future research is clearly warranted. The research from these two youngsters suggests that text structure plays a role in comprehensibility, and that cognitive strategy instruction to retrieve that structure and use it in writing can overcome weaknesses in grammaticality of writing, and possibly reading comprehension.

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Legend of Figures

Figure 1. Sample teacher's "think-aloud".

Figure 2. Graphed data for subject 1.

Figure 3. Graphed data for subject 2.

Figure 4. Recall of story elements during baseline.

Figure 5. Recall of story elements during intervention.

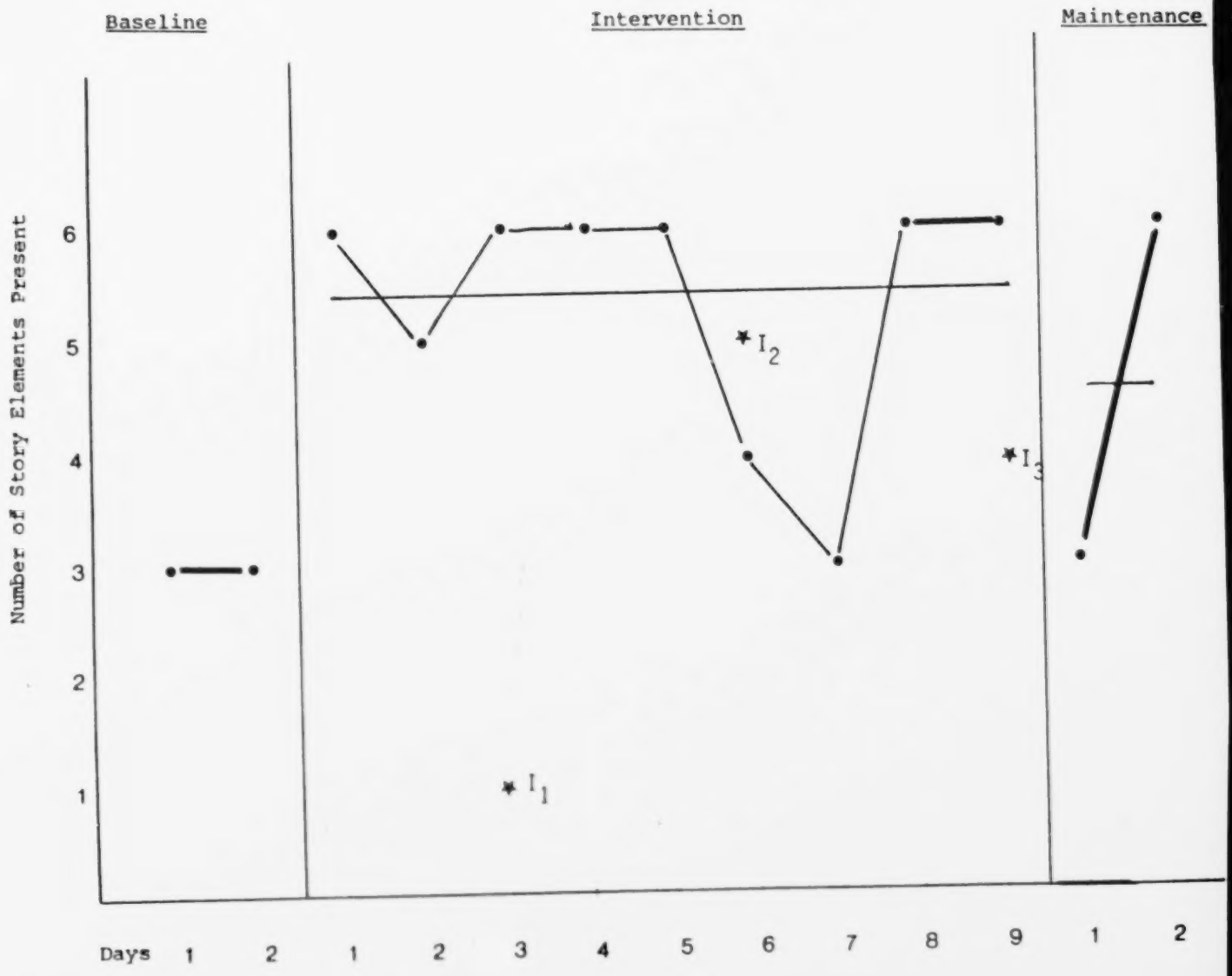

Figure 2. Graphed data for subject 1. I = intervention probe.

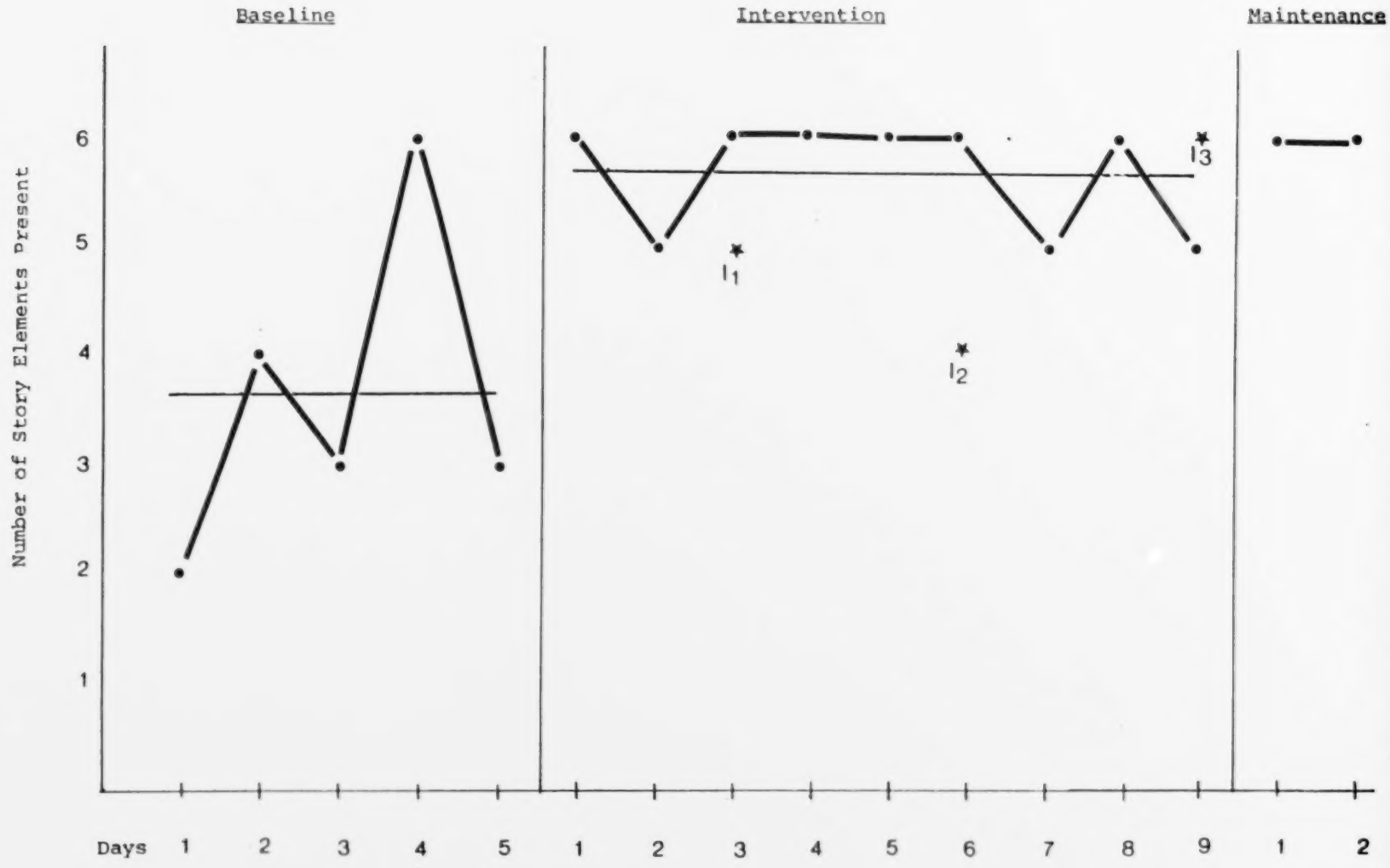

Figure 3. Graphed data for subject 2. I = intervention probe.

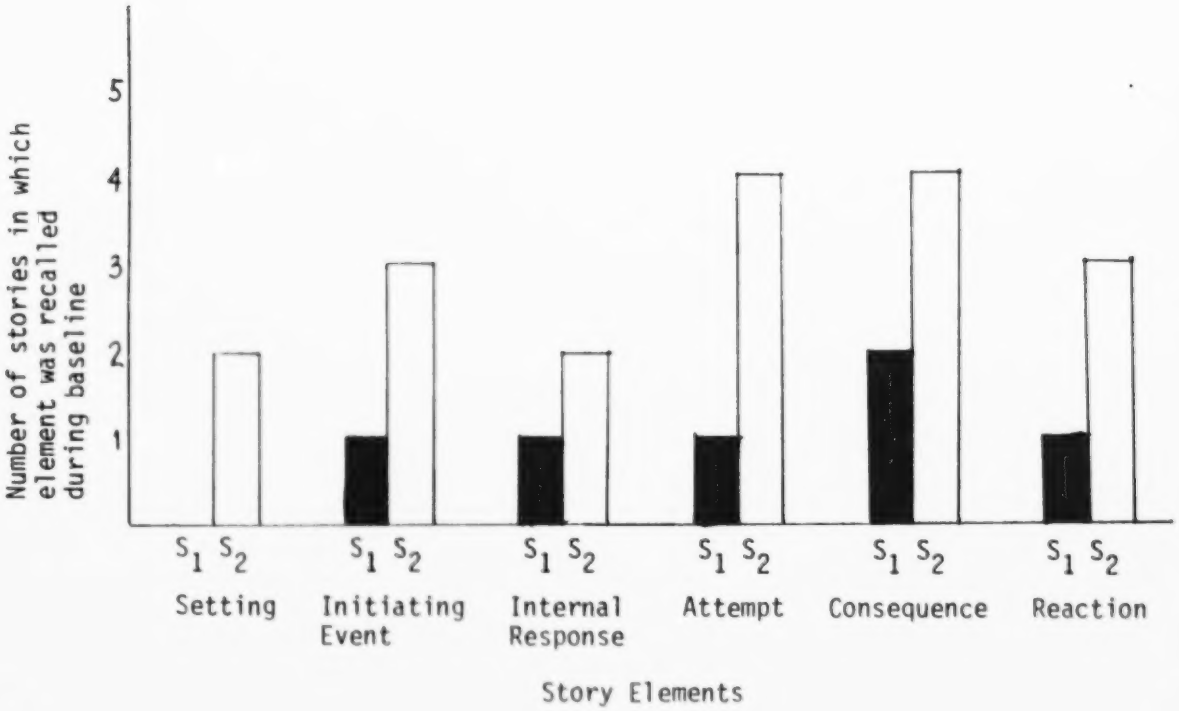

Figure 4. Recall of story elements during baseline. Maximum possible for S_1 was 2; maximum possible for S_2 was 5.

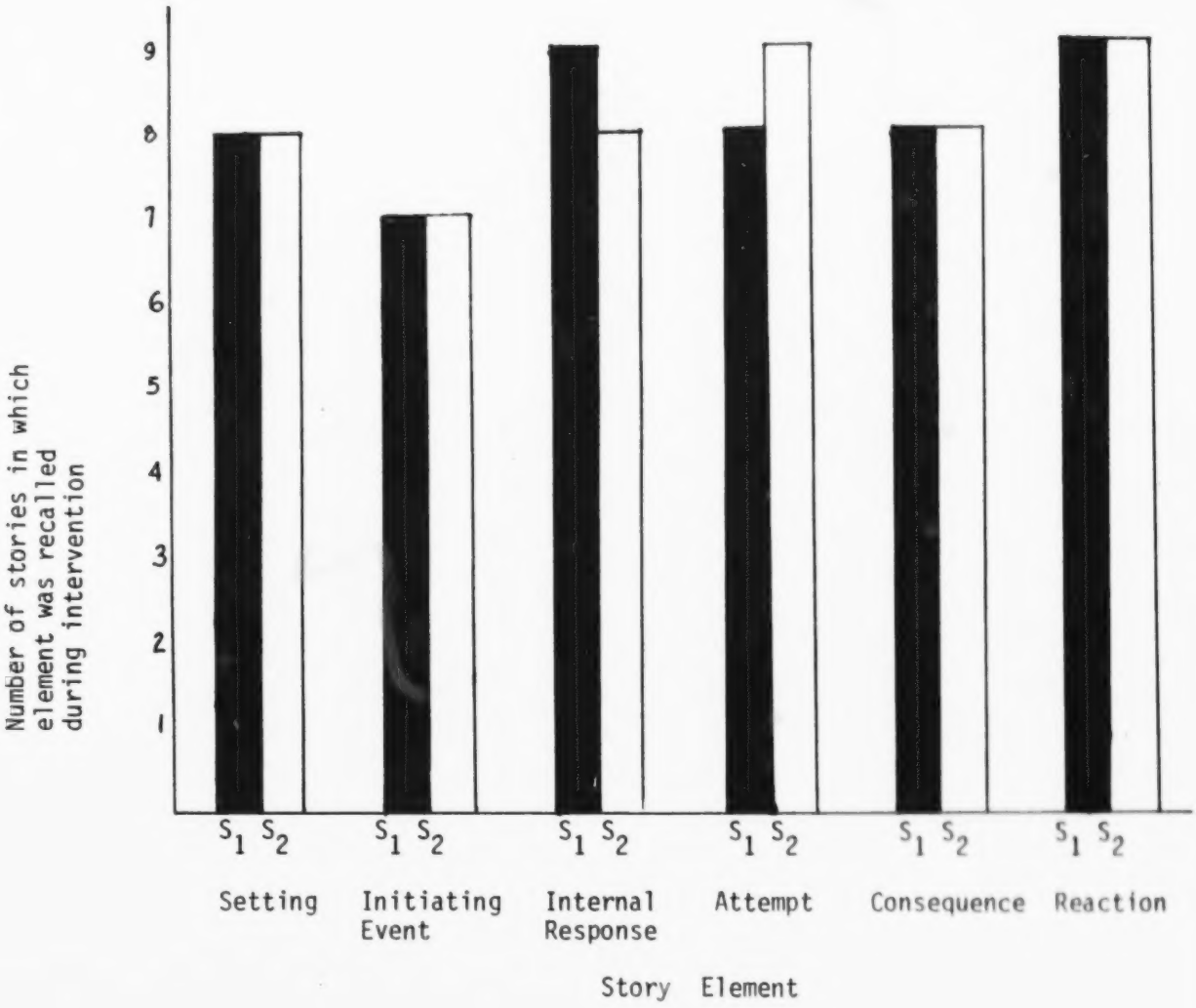

Figure 5. Recall of story elements during baseline.